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Integrated Environmental Management
A Need for Change

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F7 INTERGRATED ENVIRONMENTAL MANAGEMENT: A NEED FOR CHANGE

This report is part of the National Network for Environmental Management Studies under the auspices of the Office of Cooperative Environmental Management of the U. S. Environmental Protection Agency (EPA). EPA was created in 1970 by President Nixon's Reorganization plan in an effort to integrate the responsibilities for protection of the environment. Prior to 1970, environmental programs were implemented in separate agencies. Nixon stated that an effective approach to pollution control would be to trace the pollutants through the entire ecological chain, examining its changes in form and determining the total exposure to human health and the environment, and identifying where controls would be appropriate. It is from this genesis that the author begins this examination of present day environmental management.

Integrated environmental management means implementing environmental laws in a concerted fashion, such that one approaches environmental problems in holistic manner. The author reports the degree of implementation of laws and examines the obstacles blocking the way to an integrated system and what can be done to overcome these problems. A detailed evaluation of all the obstacles and problems is not made here, but such a study can build from recommendations and conclusions in this report.

This study will be important to environmental engineers and scientists working in regulatory agencies and in industry, to provide a broad picture of different laws and illustrate the application of these laws to a case study: the Syntex Chemicals, Inc. facility. Additionally, the assessment of how the laws are integrated and what integration initiatives have worked and which have not, should be considered by EPA in its efforts to streamline and improve its organization and procedures.

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A NEED FOR CHANGE

A Report
Presented to the
Civil, Environmental and
Architectural Engineering Department
University of Colorado at Boulder
and to the
Office of Cooperative Environmental Management
U. S. Environmental Protection Agency

by
Diana Shannon
January 1989

Disclaimer

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The contents are essentially as received from the author. The opinions, findings, and conclusions expressed are those of the author and not necessarily those of the Environmental Protection Agency. Mention, if any, of company, process, or product names is not to be considered as an endorsement by the U. S. Environmental Protection Agency.

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CHAPTER ONE - INTRODUCTION

This report focuses on integrated environmental management within the Environmental Protection Agency (EPA). EPA was created in 1970 by President Nixon's Reorganization plan in an effort to integrate the responsibilities for protection of the environment. Prior to 1970, environmental programs were implemented in separate agencies. For example, the National Air Pollution Control Administration was located in the Department of Health, Education and Welfare and the Federal Water Pollution Control Administration was in the Department of the Interior. In his message proclaiming the establishment of this new agency, the President declared that "the environment must be perceived as a single interrelated system."[1] He stated that an effective approach to pollution control would be to trace the pollutants through the entire ecological chain, examining its changes in form and determining the total exposure to human health and the environment, and identifying where controls would be appropriate. It is from this genesis that the author begins this examination of present day environmental management.

Integrated environmental management means implementing environmental laws in a concerted fashion, such that we approach environmental problems in a holistic approach. This reports the degree of implementation of laws and examines the obstacles blocking the way to an integrated system and what we can do to

overcome these problems. A detailed evaluation of all the obstacles and problems is not made here, but such a study can build from recommendations and conclusions in this report.

This study will be important to environmental engineers and scientists working in regulatory agencies and in industry, to provide a broad picture of the different laws (Chapter Two) and illustrate the application of these laws to a case study; the Syntex Chemicals, Inc. facility (Chapter Three). Additionally, the assessment of how the laws are integrated (Chapter Four) and what integration initiatives have worked and which have not (Chapter Five) should be considered by EPA in its efforts to streamline and improve its organization and procedures.

CHAPTER TWO - OVERVIEW OF THE MAJOR ENVIRONMENTAL LAWS

Over the years since EPA's creation, Congress has enacted numerous new pieces of environmental legislation. Today, EPA has authority and responsibilities under a multitude of laws: i.e. the Asbestos Hazard Emergency Response Act; the Clean Air Act; the Clean Water Act; the Comprehensive Environmental Response, Compensation, and Liability Act; the Environmental Research and Sanctuaries Act; the Ocean Dumping Act; the Resource Conservation and Recovery Act; the Safe Drinking Water Act; and the Toxic Substances Control Act. These statutes cover the whole environment, from air to water to soils, and they affect a broad range of industries. This Chapter will present an overview of those major environmental laws that directly apply to a common environmental problem: releases of hazardous chemicals from an industrial facility. Chapter Three is the case study of the Syntex Chemicals, Inc., Boulder, Colorado facility. This Chapter will prepare the stage for the case study by outlining the following major statutes:

1. Resource Conservation and Recovery Act (RCRA)
2. Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)
3. Clean Water Act (CWA)[2]

I. RESOURCE CONSERVATION AND RECOVERY ACT

The objectives of the Resource Conservation and Recovery Act (RCRA) are to promote the protection of health and the environment and to conserve valuable material and energy sources. These objectives are to be achieved by requiring proper management of municipal and hazardous waste, establishing viable state programs, and promoting resource recovery and resource conservation systems which preserve and enhance the quality of air, water, and land resources. The overall national policy in this law is to reduce or eliminate the generation of hazardous waste whenever possible and manage waste that is nevertheless generated in a manner that minimizes the present and future threat to human health and the environment.

RCRA consists of nine Subtitles. A brief summary of these sections is presented below:

Subtitle I - General Provisions - Includes Congressional findings; objectives of the Act and the national policy; definitions; and discussions on integration with other Acts, financial disclosure and solid waste management information and guidelines.

Subtitle II - Office of Solid Waste: Authorities of the Administrator - Describes the authorities of the Administrator of the Environmental Protection Agency; establishes the Office of Solid Waste; provides allocation of funds; and establishes an Office of Ombudsman.

Subtitle III - Hazardous Waste Management - Requires

the development and promulgation of criteria for identifying the characteristics of hazardous waste, listings of hazardous waste and promulgation of regulations for generators, transporters, and treatment, storage, and disposal facility owners and operators; provides for exemptions for several classes of waste; describes authorization requirements for State programs; provides provisions for the corrective action program; and defines inspection requirements and Federal enforcement authorities.

Subtitle IV - State or Regional Solid Waste Plans - Defines criteria for and approval requirements for solid waste plans and provides authority and appropriations for Federal assistance to States and rural communities.

Subtitle V - Duties of the Secretary of Commerce in Resource and Recovery - Defines how the Secretary of Commerce shall encourage greater commercialization of proven resource recovery technology.

Subtitle VI - Federal Responsibilities - Defines the responsibilities of all Federal agencies to comply with solid and hazardous waste management requirements.

Subtitle VII - Miscellaneous Provisions - Describes employee protection, citizens suits, imminent hazard authority, and requirements for regulation petitions and judicial review of such petitions.

Subtitle VIII - Research, Demonstration, Training, and Information - Includes authority, plans, and criteria for research, development and, demonstrations.

Subtitle IX - Regulation of Underground Storage Tanks - Lists definitions and exemptions; notification requirements; requires promulgation of regulations for release detection, prevention, and corrective action; describes criteria for approval of State programs; provides for Federal enforcement; describes the responsibilities of all Federal agencies; and provides for studies and funding appropriations. Authorizes EPA to require cleanup of leaking underground storage tanks and established a Trust Fund to support EPA cleanup actions.

II. COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT (CERCLA)

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) does not define any overall goals or policies nor does it include a section for Congressional findings, yet this law places tremendous responsibilities on the Environmental Protection Agency with regard to responding to and cleaning up releases of hazardous substances. The definitions section itself delineates the scope of the law by defining such terms as "hazardous substance," "pollutant or contaminant," and "release."

CERCLA is comprised of four subtitles, which are summarized below:

Subtitle I - Hazardous Substance Releases, Liability, Compensation - Includes definitions of terms, establishment of reportable quantities, notification requirements, response and

abatement action authorities, criteria for revising the National Contingency Plan, relationship to other laws, and cleanup standards amongst other topics.

Subtitle II - Hazardous Substance Response Revenue - Repealed.

Subtitle III - Miscellaneous Provisions - Describes required reports and studies, transportation of hazardous substances, actions under State laws, and other topics.

Subtitle IV - Pollution Insurance - Includes definitions, risk retention groups, purchasing groups, and applicability of securities laws.

III. CLEAN WATER ACT

The objective of the Clean Water Act (CWA) is to restore and maintain the chemical, physical and biological integrity of the Nation's waters. In order to achieve this objective, Congress defined several national goals and policies in the Act. One of the major goals is to eliminate the discharging of pollutants into the navigable waters by 1985. Additionally, Federal financial assistance is to be provided to construct publicly owned treatment works, areawide waste treatment management plans are to be developed to assure adequate control of pollutant sources, a major research and demonstration effort is to be undertaken to develop technology necessary to eliminate the discharge of pollutants, and the States are to manage the construction grant program and implement CWA permit programs.

The CWA is composed on six major parts:

Subtitle I - Research and Related Programs - Defines goals and policies of the Act; describes the preparation and development of a comprehensive program for preventing, reducing, or eliminating the pollution of navigable waters and ground waters; establishes research, investigation, pollution control, and training programs and grants for such programs; and provides for scholarships for undergraduate study.

Subtitle II - Grants for Construction of Treatment Works - Authorizes the EPA to make grants for the construction of publicly owned (State, municipality, etc.) and privately owned treatment works; defines the limitations and conditions on use of grants and grant allotments; and describes areawide waste treatment management requirements.

Subtitle III - Standards and Enforcement - Declares that discharging of any pollutant not in compliance with the requirements of the CWA shall be unlawful; empowers EPA with enforcement authorities; sets out a timetable for achieving effluent limitations for point sources and publicly owned treatment works; requires the development of water quality criteria, effluent guidelines, a list of toxic pollutants and pretreatment standards; and establishes a program for prevention and cleanup of discharges of hazardous substances and oil.

Subtitle IV - Permits and Licenses - Defines the National Pollutant Discharge Elimination System, ocean discharge criteria, and the permit requirements for dredged or fill

material.

Subtitle V - General Provisions - Includes definitions, emergency powers, citizen suits, employee protection, among other topics.

Subtitle VI - State Water Pollution Control Revolving Funds - Authorizes EPA to make capitalization grants to States for establishing a water control revolving fund for providing assistance for construction of treatment works, implementing nonpoint source management and estuary programs, defines capitalization grant agreement requirements, and provides the allotment of funds.

CHAPTER THREE - CASE STUDY: SYNTEX CHEMICALS, INC.

This Chapter includes a brief description of the Syntex Chemicals, Inc., (Syntex) facility, its environmental setting, the releases that have occurred from the site, and how the environmental laws apply to the site. For a more detailed evaluation, reference should be made to the "RCRA Facility Assessment Report," prepared by this author for EPA.[3]

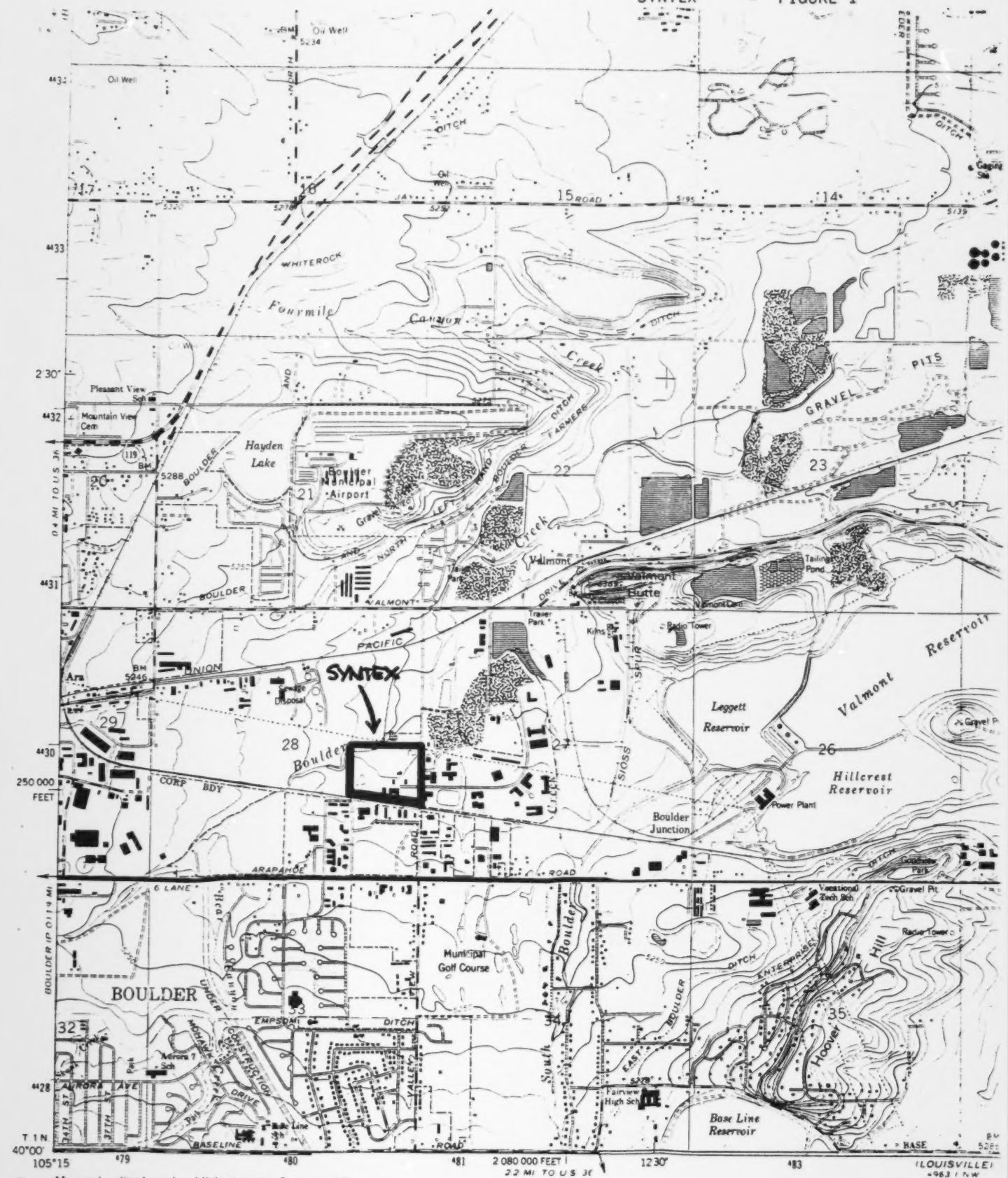
I. GENERAL FACILITY DESCRIPTION

The Syntex plant is involved in the manufacture of pharmaceutical and specialty organic chemicals and related research and development. The plant was built in 1966 by Arapahoe Chemicals, Inc. Syntex acquired Arapahoe Chemicals, Inc., in 1982.

The plant is located in the eastern most portion of the City of Boulder, Colorado. Its location is depicted on Figure 1. The Syntex facility covers 32 acres and is bordered by 55th Street to the east, light industry and small businesses to the south, and the Boulder County Humane Society to the north. Boulder Creek flows adjacent to the northwest portion of the site. The site is adjacent to the 100 year flood plain of Boulder Creek.

The Syntex facility consists of administration and maintenance buildings, manufacturing plant buildings, warehouses, several above ground tank farms, a buried tank farm, a hazardous

SYNTEX - FIGURE 1



Mapped, edited, and published by the Geological Survey
Revised in cooperation with the Inter-County Regional Planning Commission

Control by USGS and NOS/NOAA

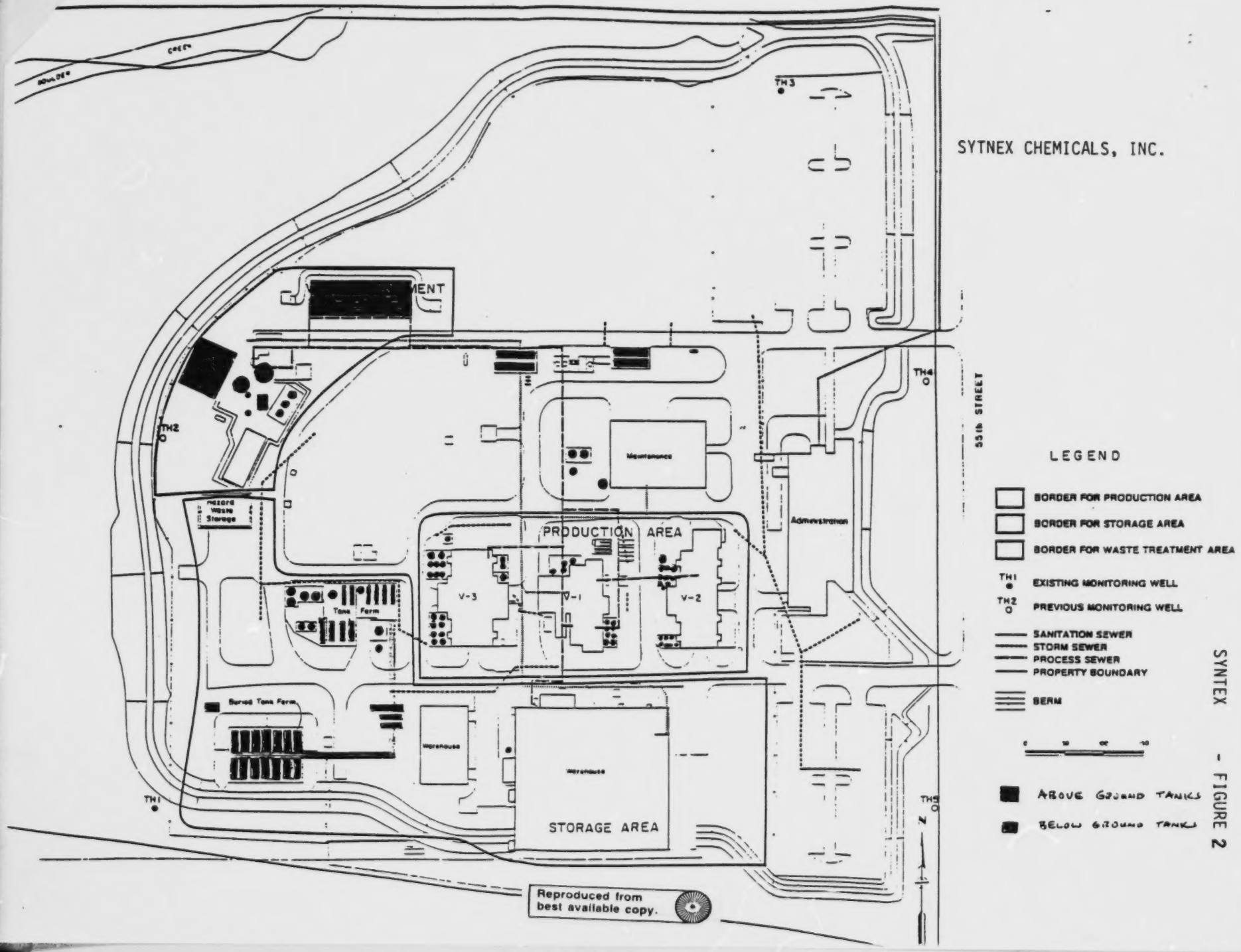
Reproduced from best available copy.

waste storage area, a waste water treatment facility with basins, and a new technology center and a pilot plant. Reference should be made to Figure 2 of this report for the location of these buildings.

Syntex's site investigations indicate that the alluvium under the site is extremely variable ranging from gravel and cobbles, closest to Boulder Creek and the southern end of the site; to silty sand and clay at the central western area.[4] Bedrock was determined to be at a depth varying from 7 to 17 feet across the site. Figure 3 of this report shows bedrock surface contours. Water table elevations were contoured and appear in Figures 4 and 5. Additionally, hydraulic conductivity ranging from 21 to 320 feet/day and ground-water flow equal to 1 foot per day were calculated by Syntex's consultant.[4]

II. ENVIRONMENTAL RELEASES/PROBLEMS

A variety of toxic materials have been generated and released from the Syntex site since operations began. These releases include chemical spills, discharges to the City sewer system, and air emissions. This Section presents information known about the location and characteristics of waste management units and other areas that may contribute to releases from the site. Additionally, information about known or suspected releases from these units or areas is also included.



SYTNEX - FIGURE 2

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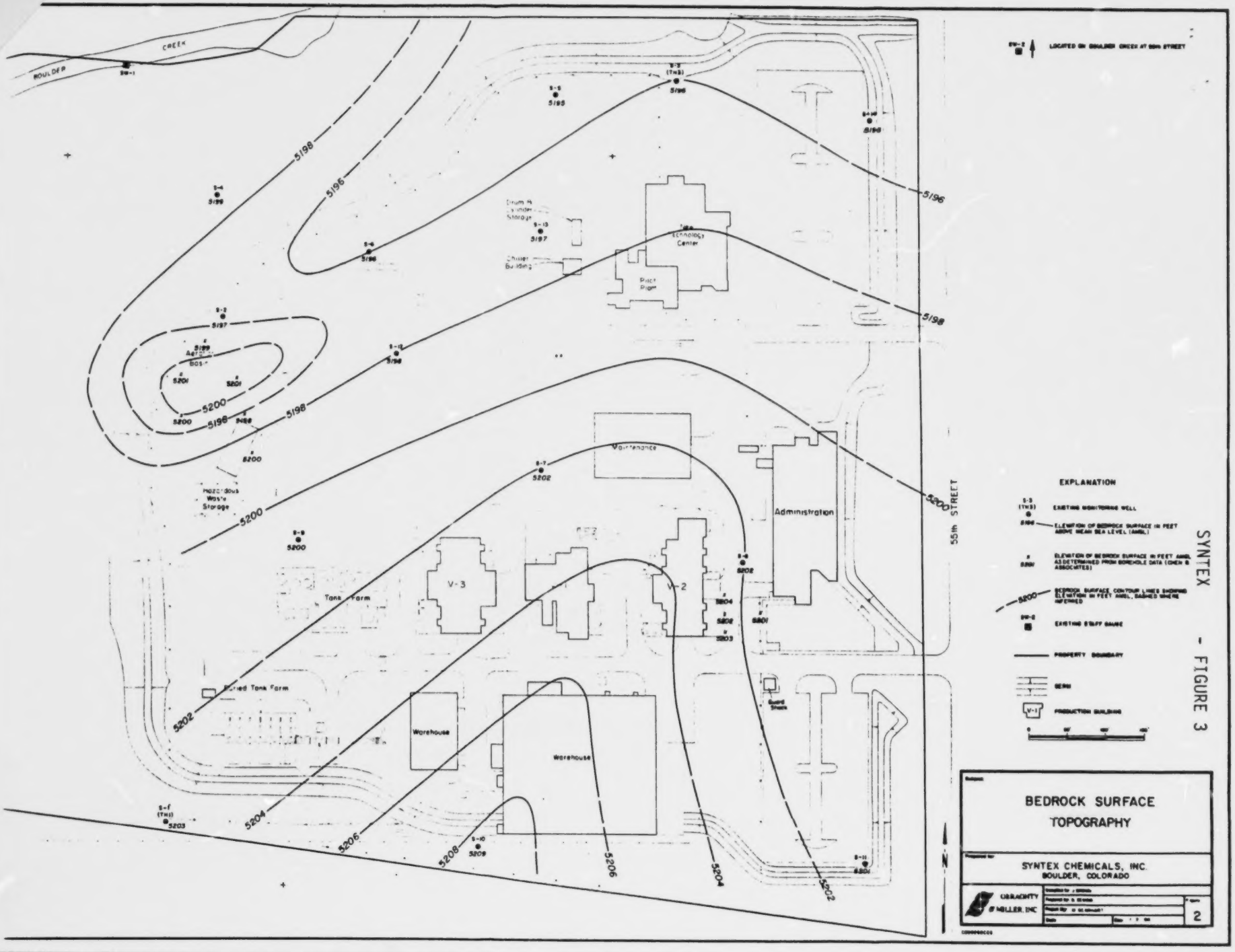
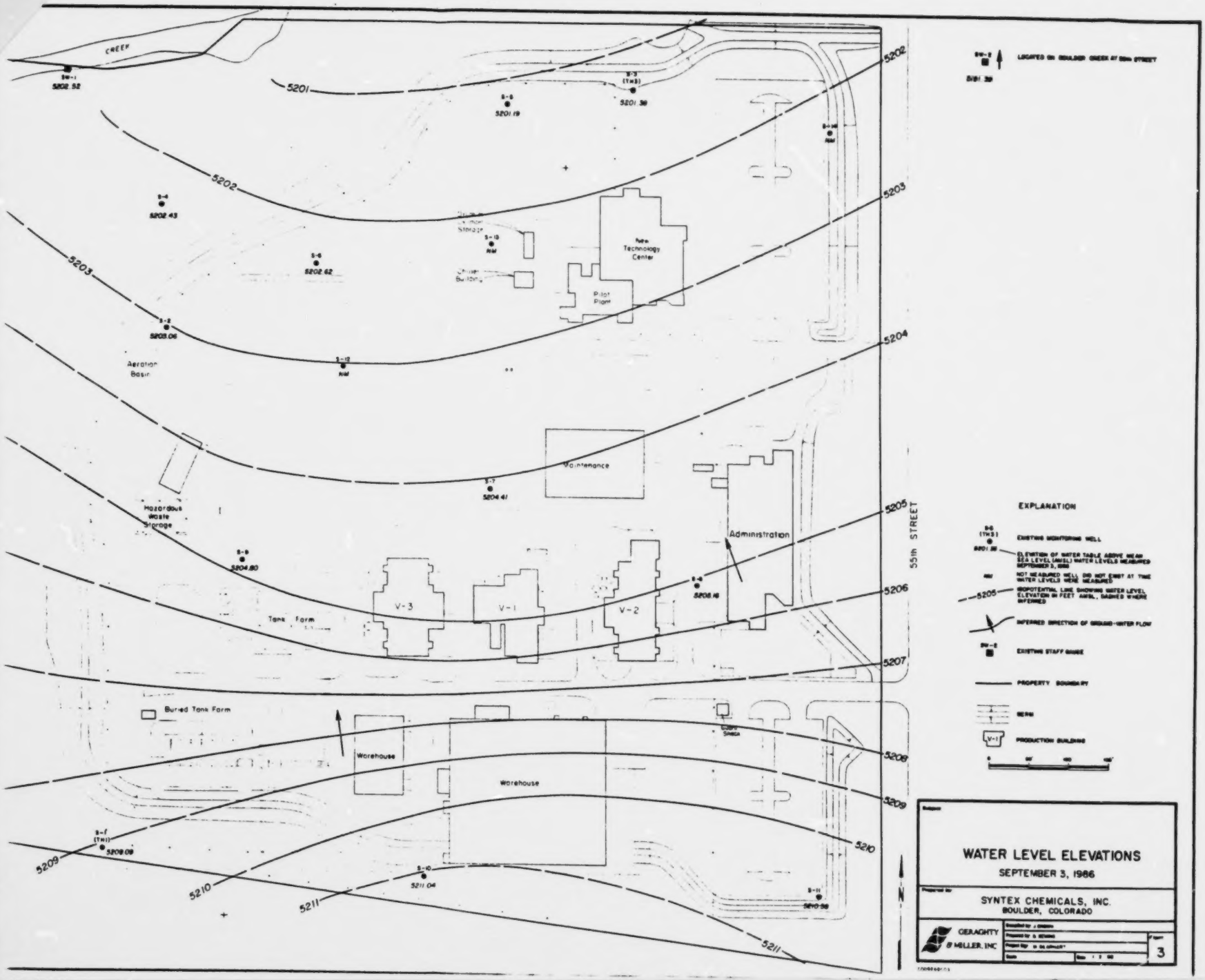
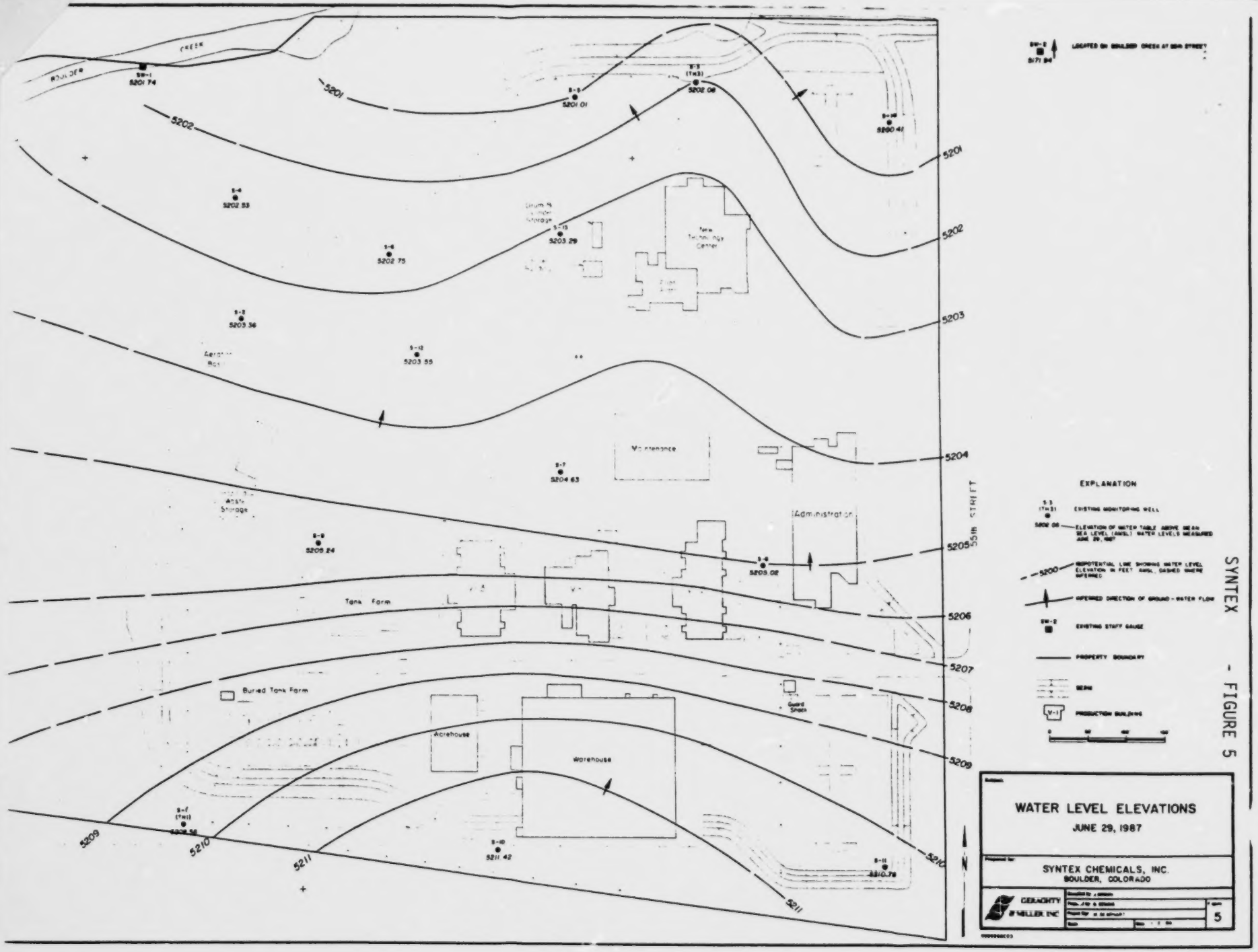

BOULDER CREEK
5198
5196
5200
5202
5204
5206
5208
Drum & Waste Storage
Shiver Building
R&A Technology Center
Pilot Plant
Maintenance
Hazardous Waste Storage
Administration
55th STREET
Tank Farm
V-3
V-2
Buried Tank Farm
Warehouse
Warehouse
Guard Shack
EXPLANATION
EXISTING MONITORING WELL
ELEVATION OF BEDROCK SURFACE IN FEET ABOVE MEAN SEA LEVEL (AMSL)
ELEVATION OF BEDROCK SURFACE IN FEET AMSL AS DETERMINED FROM BOREHOLE DATA (OHM & ASSOCIATES)
BEDROCK SURFACE CONTOUR LINES SHOWING ELEVATION IN FEET AMSL, DASHED WHERE INFERRED
EXISTING STAFF GAUGE
PROPERTY BOUNDARY
BERM
PRODUCTION BUILDING
BEDROCK SURFACE TOPOGRAPHY
SYNTEX CHEMICALS, INC.
BOULDER, COLORADO
OBRIEN & MOLLER, INC.
SYNTEX - FIGURE 3



SYNTEX - FIGURE 4

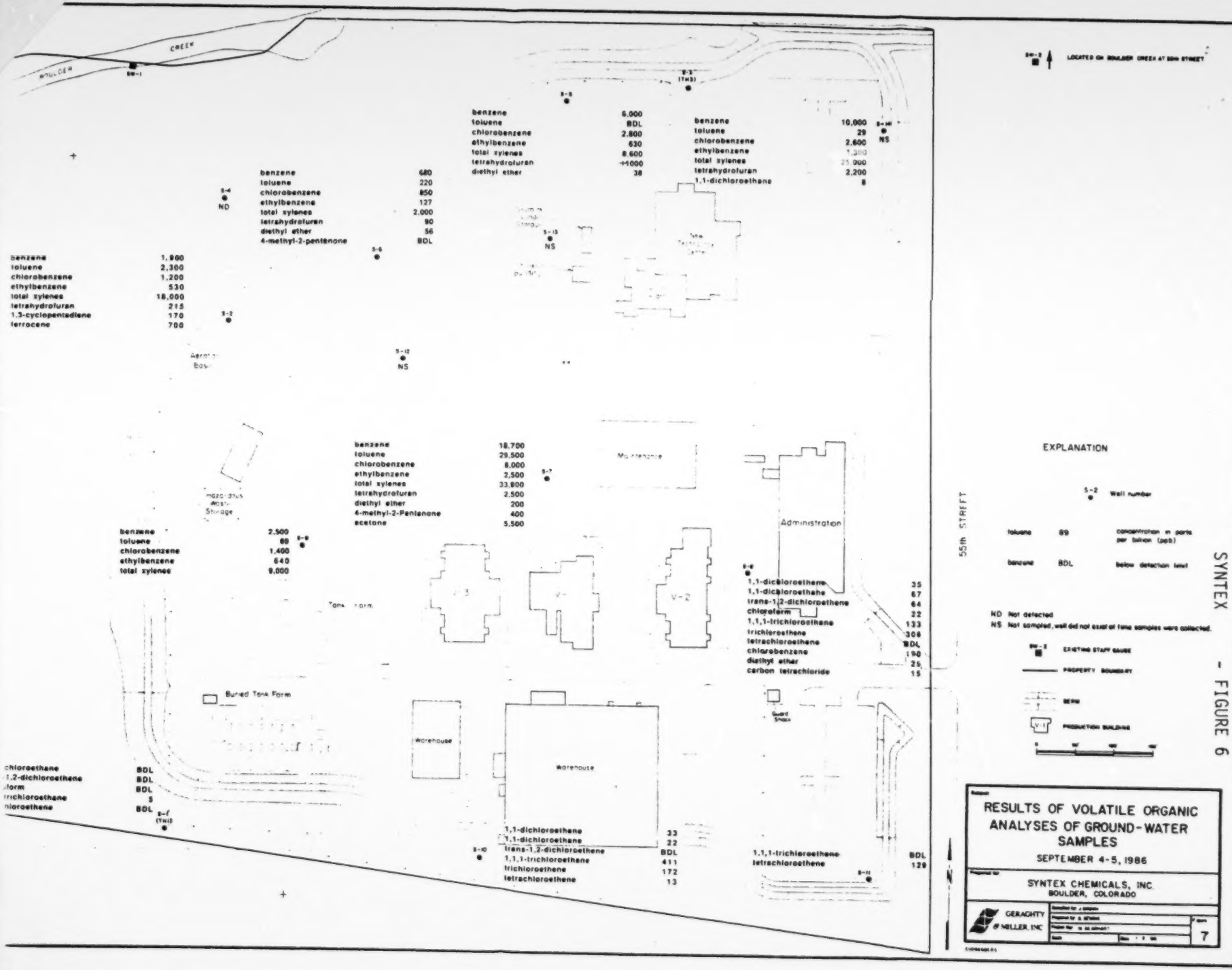


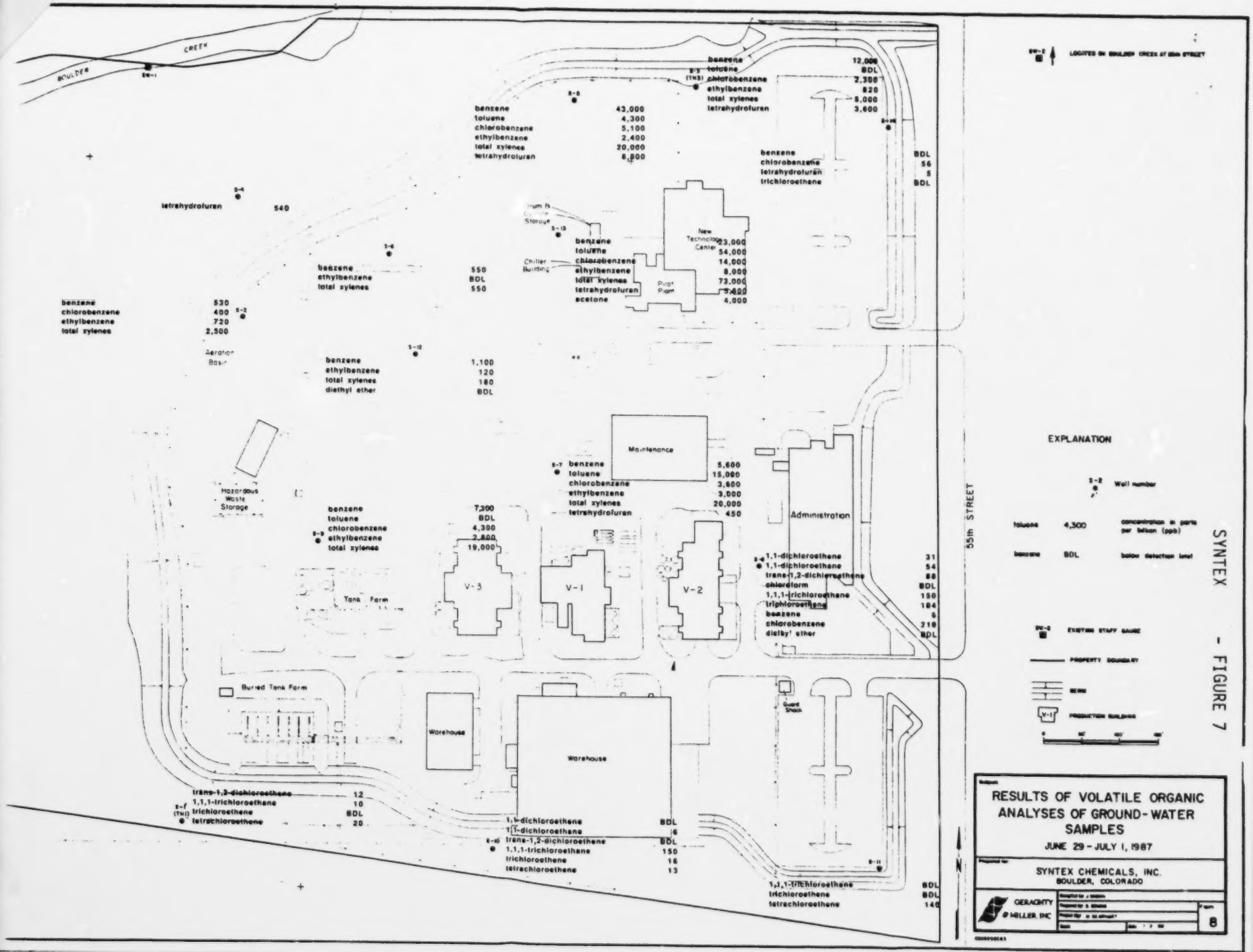
SYNTEX - FIGURE 5

A. Ground-water Contamination

Geraghty & Miller, Inc., Syntex's consultant,[4] analyzed ground-water samples for organic and inorganic contaminants during 1986 and 1987. The constituents and concentrations appear in Figures 6 and 7 of this report. Geraghty & Miller were able to identify two chemically different ground-water contamination plumes. The plume under the southern portion of the site, referred to as the "S-1 plume," contains 1,1-dichloroethene, 1,1-dichloroethane, trans-1,2-dichloroethene, chloroform, 1,1,1-trichloroethane, trichloroethene, and tetrachloroethene in relatively low concentrations (.005 to .411 ppm) and this plume appears to have originated from off site, south of the Syntex facility. The other plume, called the "S-5 plume" includes the following contaminants: benzene, toluene, chlorobenzene, ethylbenzene, xylenes, and tetrahydrofuran ranging in concentrations from 0.18 to 73 ppm. These two plumes were plotted as contours of total volatile organic constituents by Geraghty & Miller, appearing as Figure 8. The contaminants found in the "S-5 plume" are constituents which Syntex has or is now using in its operations.

Geraghty & Miller found elevated concentrations of sulphate and nitrate near the "S-1 plume" and elevated concentrations of chloride, bromide, and sodium near the "S-5 plume." Heavy metals used by Syntex in their operations (mercury, hexavalent chromium and total chromium) were not detected during these site investigations.


CREEK
BOULDER
SB-1
S-3 (TW3)
S-5
benzene 6,000
toluene BDL
chlorobenzene 2,800
ethylbenzene 630
total xylenes 8,600
tetrahydrofuran >1000
diethyl ether 38
benzene 10,000
toluene 29
chlorobenzene 2,600
ethylbenzene 1,300
total xylenes 21,900
tetrahydrofuran 2,200
1,1-dichloroethane 8
S-14
NS
S-4
ND
benzene 680
toluene 220
chlorobenzene 850
ethylbenzene 127
total xylenes 2,000
tetrahydrofuran 90
diethyl ether 56
4-methyl-2-pentenone BDL
S-13
NS
S-6
benzene 1,900
toluene 2,300
chlorobenzene 1,200
ethylbenzene 530
total xylenes 18,000
tetrahydrofuran 215
1,3-cyclopentadiene 170
ferrocene 700
S-2
S-12
NS
Aeration Basin
benzene 18,700
toluene 29,500
chlorobenzene 8,000
ethylbenzene 2,500
total xylenes 33,900
tetrahydrofuran 2,500
diethyl ether 200
4-methyl-2-Pentanone 400
acetone 5,500
S-7
Maintenance
Hazardous Waste Storage
benzene 2,500
toluene 89
chlorobenzene 1,400
ethylbenzene 640
total xylenes 9,000
S-9
Tank Farm
V-3
V-1
V-2
Administration
S-8
1,1-dichloroethene 35
1,1-dichloroethane 67
trans-1,2-dichloroethene 64
chloroform 22
1,1,1-trichloroethane 133
trichloroethene 306
tetrachloroethene BDL
chlorobenzene 190
diethyl ether 25
carbon tetrachloride 15
55th STREET
Buried Tank Farm
Guard Shack
Warehouse
Warehouse
chloroethane BDL
1,2-dichloroethene BDL
form BDL
trichloroethane 5
nloroethene BDL
S-1 (TW1)
1,1-dichloroethene 33
1,1-dichloroethane 22
trans-1,2-dichloroethene BDL
1,1,1-trichloroethane 411
trichloroethene 172
tetrachloroethene 13
S-10
1,1,1-trichloroethane BDL
tetrachloroethene 129
S-11
SB-2 LOCATED ON BOULDER CREEK AT 55th STREET
EXPLANATION
S-2 Well number
toluene 89 concentration in parts per billion (ppb)
benzene BDL below detection limit
ND Not detected
NS Not sampled, well did not exist at time samples were collected.
SB-2 EXISTING STAFF GAUGE
PROPERTY BOUNDARY
BERM
V-1 PRODUCTION BUILDING
0 100 200 400
RESULTS OF VOLATILE ORGANIC ANALYSES OF GROUND-WATER SAMPLES
SEPTEMBER 4-5, 1986
SYNTEX CHEMICALS, INC.
BOULDER, COLORADO
GERAGHTY & MILLER, INC
7
SYNTEX - FIGURE 6



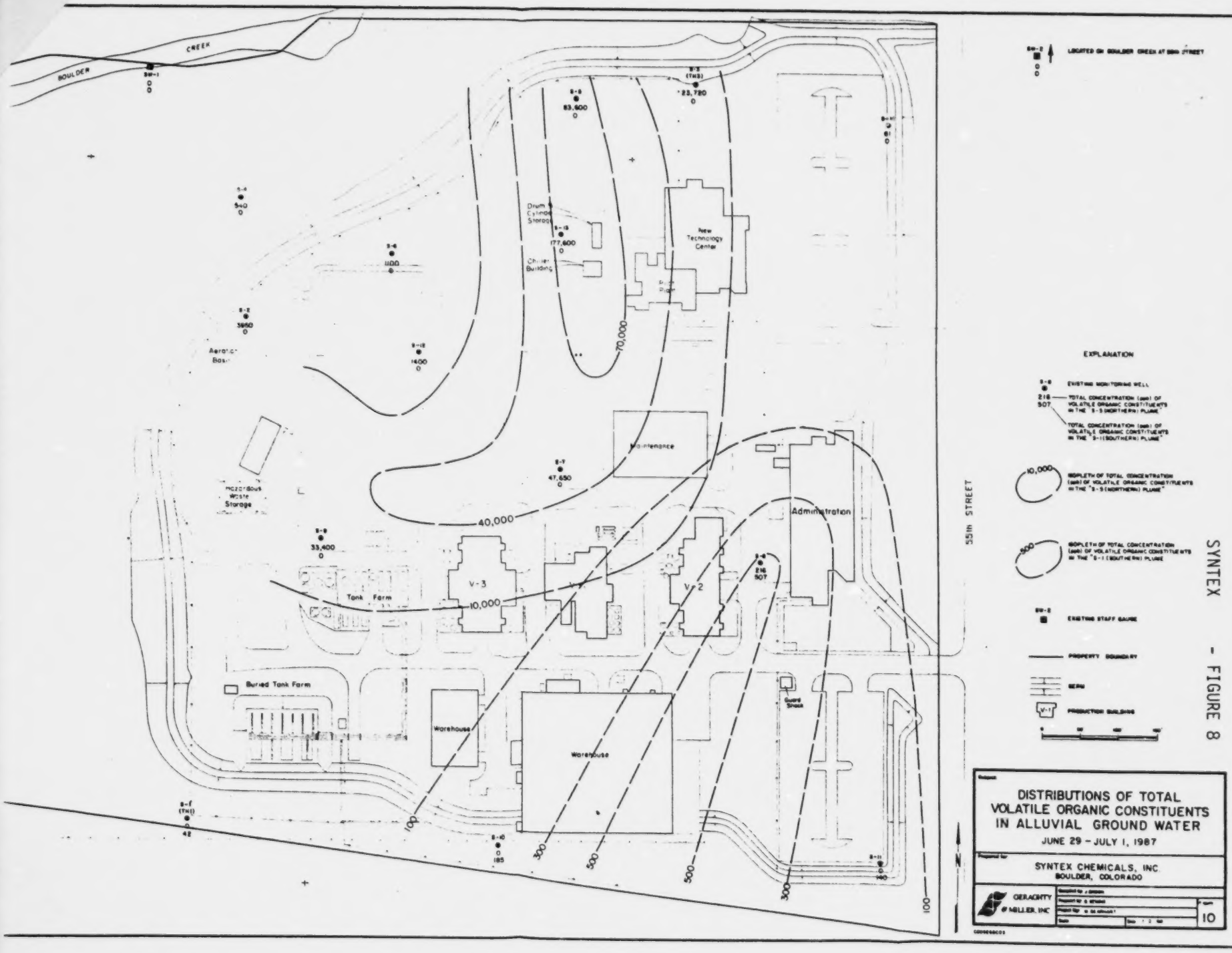
SYNTEX - FIGURE 7

RESULTS OF VOLATILE ORGANIC ANALYSES OF GROUND-WATER SAMPLES
JUNE 29 - JULY 1, 1987

SYNTEX CHEMICALS, INC.
BOULDER, COLORADO

GERAGHTY & MILLER, INC

8



SYNTEX - FIGURE 8

DISTRIBUTIONS OF TOTAL VOLATILE ORGANIC CONSTITUENTS IN ALLUVIAL GROUND WATER

JUNE 29 - JULY 1, 1987

SYNTEX CHEMICALS, INC.
BOULDER, COLORADO

GERAGHTY & MILLER, INC.

10

Recent investigations by Syntex have identified higher concentrations of contaminants than found in 1986 and 1987, and the extent of contamination is wider than initially thought.

B. Hazardous Waste Storage Area

Various types of wastes are stored in this area, including waste dimer containing solvents, solvent still bottoms, chromium and mercury salts, off-specification pharmaceutical products, laboratory samples and research chemicals, by-product 2-methoxynapthalene (nerolin), and filter cake containing heavy metals. Since 1980, the only known indication of hazardous waste leakage from the drum storage area was identified during the January 13, 1981, EPA RCRA inspection, when small amounts of salts were noted on the bottoms of the drums. Records searches conducted by this author have revealed poorly managed and leaking chemical waste drums in 1979 at several locations on the site.[3] Mismanagement of hazardous waste was not uncommon prior to the promulgation of the RCRA regulations in 1980 and since record keeping was not required there are no details on the quantity and type of chemicals leaking from containers in 1979.

C. Surface Impoundments, Basins, and Sumps

Syntex manages its industrial wastewater in settling and flocculation tanks. Additionally, production area spills are collected in various sumps. No information is now available about leakage from these units.

D. Above and Below Ground Tanks

The Syntex facility has a large number of tanks for chemical storage. Again no specific information is now available on spillage or leakage from these units.

E. Process Area Spills

Syntex has indicated that chemical spills may have occurred at several locations near the center of the site (depicted on Plate 1 of the Geraghty & Miller report.)[4] Additionally, spills were reported to the Colorado Department of Health's Air Pollution Control Division and this information is included in this author's "RCRA Facility Assessment Report."[3] Some of the chemical spilled were methanol, acetone, tetrahydrofuran, toluene, xylenes, diethyl ether, methylene chloride and proprietary production chemicals. More information about these releases need to be obtained from record searches and interviews with former employees.

F. Other Areas

Like many other large industrial operations, Syntex has a "bone yard" consisting of used process equipment, tanks, etc. This area may have received chemicals or equipment that resulted in releases of chemicals to the environment. Additionally, underground pipelines have been used at the facility and an assessment needs to be made to determine if leakage occurred.

III. HOW THE ENVIRONMENTAL LAWS APPLY TO THE SITE

Since initiation of operations in 1966, there have been a variety of releases of toxic and hazardous substances. Some of these releases were legally permitted, (e.g.,sewer discharges, air emissions) and some occurred in the absence of environmental regulation (e.g., spills from chemical waste drums prior to the RCRA regulations.) The application of the environmental laws to the site is discussed in this Section.

A. Air Releases

The original air permits were issued to Arapahoe Chemicals, Inc. There have been over a dozen permits issued; each applicable to a different emission point, including storage tanks, production buildings, warehouses, the experimental laboratory, the waste water treatment facility, and the incinerator and boilers. The permits apply to the release of a multitude of chemicals, a few of which are: benzene, hexane, tetrahydrofuran, toluene, methanol, acetone, n-butanol, isopropanol, xylene, and n-octane. Even though Syntex has a large number of air permits, none have been issued for hazardous waste activities, including the cleanup actions now underway. Future cleanup activities, such as treatment of the contaminated ground-water or reinjection, may fall under the auspices of the Clean Air Act if they involve air emissions.

As noted in the previous Section, there were numerous

reports of spills of chemicals resulting in emissions to the air. Further, the Boulder City-County Health Department cited the company for violations of the Colorado Air Pollution Control Commission regulations in 1987. The permitted air releases are not related to the ground-water contamination, however, the information about past spills reported to the State and County may aid in identification of the source or sources of contamination to ground water.

B. Discharges to Sewer System and Direct Surface Water Releases

The plant has discharged its sanitary and industrial wastes to the City of Boulder's publicly owned treatment works since at least 1972. Syntex began operation of its upgraded wastewater treatment plant in February 1985. The pretreatment consists of extended detention activated sludge. The plant's discharge permit limits COD, pH, and electrolytic respirometer levels. Syntex's permit also stipulates that no priority pollutants may be discharged. After treatment the City's discharges its wastewater effluent to Boulder Creek.

Two pertinent pretreatment program issues have recently surfaced, one relating to the application of categorical pretreatment standards to Syntex's industrial discharge and one related to the City's inability to accept the contaminated ground-water even after it is treated. If the categorical standards are found to be applicable the City will require additional permit standards. With regard to the ground-water

discharge, the company requested that the City consider accepting the treated waters. This summer Syntex was notified that the City Code prohibits the introduction of ground water into the City sewer system. Syntex is evaluating other options for disposal of the treated ground water.

Available information indicates that there were no surface water discharges from the site. As noted above, sanitary and industrial wastewaters are released to the City's sewer system. Additionally, all surface drainage is collected in storm sewers and discharged to the City system.

Past practices may have involved either routine discharges to Boulder Creek prior to the development of an effective water quality program (that is prior to the creation of EPA) or unintentional releases resulted from leakage or spills. This matter needs to be investigated further, especially for the period 1966 until 1972.

Ground-water contamination may be impacting the surface water quality of Boulder Creek. EPA sampling in April 1988 did not show any detectable concentrations of contaminants in the creek, though more recent studies show the presence of one organic chemical in ground-water on the opposite side of the Creek from the plant.

Boulder Creek is classified as agricultural, recreational, for aquatic life and as a drinking water supply. The creek is used as a supply for the Town of Frederick's drinking water reservoir, therefore contamination from Syntex may impact this

drinking water supply which would impose the authorities of the Safe Drinking Water Act. In-stream requirements above state stream standards pertaining to drinking water classification may apply and would be controlled by the Clean Water Act.

This fall, Syntex submitted an application to the State for a surface water National Pollutant Discharge Elimination System (NPDES) permit to release the treated ground water in the future. The effectiveness of the company's proposed reinfiltration gallery will dictate the need for the NPDES discharge permit.

C. Ground-water Releases

Several environmental laws are applicable to this ground-water contamination. At the present time the authorities of RCRA (and State equivalent authorities) are being used to regulate the site investigations and undertake the interim ground-water interceptor and infiltration activities. The site is subject to RCRA because hazardous wastes are stored at the site. CERCLA authorities are certainly broad enough to apply to the site, but EPA policy specifies that sites with responsive and viable owners be handled under RCRA authorities. Superfund resources can be used to investigate the "S-1 plume" and this has been initiated within EPA through the Environmental Priorities Initiative (which is discussed in Chapter Five of this report). The constituents of the ground-water plume also control which environmental laws apply. It can be seen from Figure 6 that the "S-5 plume" includes benzene, toluene, and xylenes, components of refined

petroleum oil, gasoline. CERCLA specifically exempts petroleum products and its fractions, so CERCLA may have limited application if the "S-5 plume" is determined to be solely associated with a petroleum source. The petroleum "loopholes" are discussed in more detail in the following Chapter.

As noted above, the Safe Drinking Water Act and Clean Water Act requirements may apply if the ground-water contamination impacts Boulder Creek, the source of drinking water for the Town of Frederick. In addition, the Safe Drinking Water Act (SDWA) may apply to disposal of the treated ground water, depending on the type of ground-water reinjection system. It is important to note that the proposed reinfiltration gallery consists of a horizontal pipeline system which does not meet the definition of a "well" which must be deeper than it is wide (Underground Injection regulations, CFR, Title 40, Section 146.3).

D. Releases to Soils

As noted earlier, historical information indicates that numerous spills of chemicals have occurred at the site. Additionally, a fire at the plant several years ago may have resulted in releases of chemicals to soils. Specific information about the quantity and type of chemical spills still need to be gathered. The sources of the ground-water contamination have likely contributed to subsurface soil contamination which will need to be addressed once identified. The authorities of both RCRA and CERCLA can be invoked to address soils contamination.

CHAPTER FOUR - HOW ARE THE ENVIRONMENTAL LAWS INTEGRATED?

The environmental laws are promulgated and implemented in a segmented fashion. These laws are media-specific, that is the Clean Water Act controls the quality of surface waters and the Clean Air Act regulates discharges to the atmosphere. However, we know that environmental pollution does not adhere to media boundaries and this segmentation inhibits integration of the various media-oriented programs.

This issue has been the subject of much study because this fragmentation leads to duplication of regulatory agency efforts, lack of environmental controls that result from inconsistencies and gaps between the laws, and lack of coordination between the various program personnel trying to address the same environmental releases.

This Chapter describes some of the inconsistencies and gaps between the laws and raises issues about the legislative process and EPA's present organization. The Syntex case study is referenced to better illustrate these issues. This Chapter is followed by a look at effective EPA program integration efforts.

I. OVERLAPPING AUTHORITIES/INCONSISTENCIES

Each environmental statute generally includes a "catch-all" paragraph addressing interrelationships with other Acts. Language such as,

"The Administrator shall integrate all provisions of this Chapter for purpose of administration and enforcement and shall avoid duplication, to the maximum extent practicable, with the appropriate provisions of the Clean Air Act...the Federal Water Pollution Control Act...."(RCRA Section 1006(b)(1))[2]

The goals of this paragraph seem simple and straightforward, but the integration problems raised in this report illustrate the real challenge. This Section will present examples of the inconsistencies and overlapping authorities between the three environmental laws studied herein. Subsequent Sections discuss issues arising from the legislative process and the organizational structure of EPA.

A. Remedial/Cleanup Programs

Both the RCRA and CERCLA programs implement remedial/cleanup actions. The CERCLA program was originally established in 1980 and comprises an emergency response program and a remedial program for longer term actions. These program are funded by the "deep pockets" of the tax-based Superfund. The RCRA corrective action program was enacted in 1984 and it does not include any emergency response authorities, nor is it supported by a separate fund, so all RCRA cleanup actions must be carried out by the regulated facility.

In 1986, the Superfund Amendments and Reauthorization Act (SARA) empowered EPA with a new authority and funding to respond

to releases from leaking underground storage tanks (LUST). Thus EPA has three cleanup programs, authorized by two different statutes and funded separately.

It is important to note that RCRA and CERCLA frequently apply to the same site and decisions have to be made about which program will be most effective or duplication of resources will result. Further, the cleanup standards and applicability of permits varies between RCRA and CERCLA, thus allowing inconsistencies between the programs.

Point in case, Syntex's ground-water contamination is addressed under RCRA and CERCLA. The "S-1 plume" is to be investigated and corrected under the Superfund authorities. This is because the plume originates off-site, assumedly from chemical users located south of the Syntex plant. The "S-5 plume" arises from sources on the Syntex site and because the facility handles hazardous wastes in its storage area, site investigations and remedial action are controlled by RCRA. The application of these two laws alone means that staff in two programs are working on the same site and investigations are conducted following separate program procedures and decisions on corrective action will be made using different criteria. To date, EPA has effectively coordinated the activities under these two programs. Questions are still unanswered about the effectiveness of coordination between the RCRA lead program and the Water Management Division, where EPA's pretreatment program lies. Further, if petroleum releases from underground tanks are identified, then the LUST

authorities may be empowered. Again the LUST investigations and cleanups are different from both RCRA and CERCLA. To make matters even more difficult, EPA personnel have to coordinate with the State's Waste Management and Water Quality Divisions and with Boulder's Pretreatment Program and County Health Department on activities at the Syntex site.

B. Petroleum Loopholes

An examination of the application of the environmental laws to the petroleum industry further illustrates the inconsistencies and gaps between the regulations. As RCRA only regulates waste, and then again only very specific wastes, the petroleum industry has enjoyed limited control under these regulations. For example, only industry wastes listed as hazardous waste nos. K048-K052 are applicable: dissolved air flotation float, slop oil emulsion solids, API separator sludge, etc.[5] The enforcement issues are complex, such as trying to determine if a separator is indeed an "API separator" or if the sludges flowing to down gradient surface impoundments are "API separator sludges." This is of particular concern to EPA because the typical unlined surface impoundment generally contributes to ground-water contamination.

CERCLA exempts petroleum, including crude oil and its fraction, from its broad authorities. While the CWA under Section 311(b) provides regulation of oil (petroleum, fuel, etc.), it only does so as it applies to discharges to "navigable

waters."[2] The Clean Water Act also applies to point source discharges to surface water. What environmental law addresses petroleum releases to surface and subsurface soils and ground water? As noted above, the 1986 SARA act applies to leaking underground storage tanks, but what about the multitude of above ground petroleum tank spills? During 1988, a bill to regulate above ground storage tanks was introduced to Congress in an attempt to plug this gap between the environmental laws.

At the Syntex site, constituents of gasoline (benzene, toluene, and xylenes) have been identified in the "S-5 plume," so CERCLA has limited authority on this plume and LUST can only be empowered if the petroleum release is from an underground tank. The Clean Water Act may also apply if discharges occur to Boulder Creek.

Even from these few examples, inconsistencies, gaps, and overlapping authorities can be seen which further complicate the already complex process of controlling environmental pollutants. Additionally, the piecemeal enactment of laws leads to the separate laws being applied to different types of releases and to different media. This issue is further discussed in the next Section.

II. LEGISLATIVE ISSUES

The number of Congressional committees and subcommittees is enormous and EPA has to deal with most of them on the various laws and responsibilities it has to carry out. A recent survey

shows that EPA works with 32 Congressional Committees and 63 Subcommittees.[6]

Several committees and subcommittees may oversee or deal with legislative issues for the different environmental media, therefore it is not surprising to see fragmented and segmented environmental legislation.

J. Clarence and Barbara Davies wrote about legislative issues in their book, The Politics of Pollution.[7] These authors highlighted the lack of communication between the subcommittees. It was noted that a committee which is formulating legislation has little contact or influence over the appropriations subcommittees. Additionally, overlapping committee authorities and conflicts have occurred which resulted in delays in several important administrative proposals in 1972.[7] The book also revealed that Congress intended to create a Joint Committee on the Environment to oversee responsibility over environmental problems. The authors believed that a joint committee would help alleviate some of the conflicts and overlapping issues, however action was never taken to create such an oversight committee.

III. EPA ORGANIZATIONAL AND PROCEDURAL IMPLICATIONS

When a new organization was being contemplated to centralize environmental authorities the President's Advisory Council on Executive Organization, headed by Roy Ash, was considering EPA's organization. The Ash Council staff recommended a structure along functional lines: enforcement, research, and standard-

setting, not an organization aligned with the different media. However, the Agency evolved into a media structure primarily because the inherited programs were media oriented.

The media-based structure lends itself to a segmented approach to environmental problems. From the examination of the Syntex site it can be seen that several different media programs are addressing the environmental problems at this one site. That is, the RCRA program controls the cleanup of one ground-water contamination plume and Superfund is used on the other plume. Further, the discharge of collected and treated ground-water may be subject to the Clean Water Act or the Safe Drinking Water Act. This author has noted coordinated efforts within EPA, however, the Agency's organization tends to hinder such coordination. The last Chapter in this report discusses some of the recent efforts within EPA to integrate environmental activities such as the cleanup at Syntex.

CHAPTER FIVE - INTEGRATED ENVIRONMENTAL MANAGEMENT

This final Chapter presents environmental management efforts that have been tried in the past. Some of which have worked while others have not. Additionally, new integration initiatives are discussed in Section II. This report then concludes with recommendations for future studies and actions.

I. WHAT'S BEEN TRIED? WHAT WORK AND WHAT DIDN'T?

A. Superfund Amendments

The 1986 SARA act mandates that cleanup action meet "all applicable and relevant or appropriate requirements" (ARARs). ARARs are the Federal and State requirements that are applicable to the cleanup actions undertaken by Superfund, however the actual pertinent permits do not have to be acquired thus allowing faster remedial actions. In practice the new legislation has become a means to ensure evaluation of all the Federal and State environmental laws to the site specific conditions at each site. Procedurally, EPA staff make preliminary determinations about ARARs early in the site investigation stage, then again when alternative remedies are being assessed and then finally upon selection and implementation of the chosen remedy. Though the ARARs process is cumbersome and time consuming, it has resulted in assessment of Superfund sites from an integrated environmental

perspective. In EPA Region VIII, communication between the Superfund Program Managers and the other media personnel (Air and Water) has increased dramatically. Futhermore, coordination between EPA and the State environmental programs has been enhanced. The effectiveness of ARARs process should be further evaluated and its application to other cleanup programs, such as RCRA corrective action and leaking underground storage tank actions should be considered.

B. The Integrated Environmental Assistance Act

In 1980, both the Senate and the House of Representatives held hearings on a new bill, titled "The Integrated Environmental Assistance Act."[8,9] EPA originally proposed this bill on April 26, 1979, to integrate environmental assistance to States and local government. Many Federal and State officials submitted testimony to support the bill. EPA and other supporters found that the 15 separate categorical grants for State assistance were rigid and limited by the legislative boundaries. It was proposed that up to 20% of the funds from categorical grants could be shifted to an integrated environmental plan covering two or more media programs. This would allow focusing of resources on unique and high priority areas. Despite its high striving objectives the bill was not introduced to either the Senate or the House. This author discussed this with Gerald Dodson, Counsel to the House Subcommittee on Health and the Environment on November 14, 1988. Mr. Dodson said there was no support for the bill within

his Subcommittee, nor was there any support in the Senate Subcommittee. The implication was that Congressional staff believed the main failing of the bill was that it gave too much discretion to EPA to move funds between programs. At a time when Congress distrusted EPA, it is not surprising that the bill was never enacted.

This author hopes the Agency becomes more credible to Congress and this type of a bill is reintroduced and passed.

C. The Consolidated Permit Program

EPA's consolidated permit program was initiated in 1980 when the Agency promulgated final regulations for merging the procedures which govern the processing of permits under the following programs:

1. Hazardous Waste Management Program (RCRA)
2. Underground Injection Control Program (SDWA)
3. National Pollutant Discharge Elimination System (CWA)
4. Section 404 (Dredge or Fill) State Program (CWA)
5. Prevention of Significant Deterioration Program (CAA)

The purpose and goals of the new regulations, described in EPA's guidance titled "A Guide to the Consolidated Permit Regulations"[10] were far reaching. The regulations established a framework for reviewing multiple permits for the same facility or activity at the same time, using similar procedures. The intent

was to ensure coordination within EPA and the State without which "there would be great potential for ineffective and contradictory controls under the different programs."[10] The guide went further to state that the new regulations would result in time and cost savings for industry due to uniform permit application and procedures and it would lead to more effective use of the Agency's limited resources. Moreover, a merged permit system would lead to a holistic assessment of each facility's impact on the environment and a means to ensure all pertinent controls were required of the industry.

The Consolidated Permit Program was evaluated by Chris Sellers in his manuscript for the Conservation Foundation titled, "The Rise and Fall of the Consolidated Permit Program--A Case Study of a Reform Effort Within the EPA."[11] EPA had espoused the new program as a reform which would save time and money and result in the Agency looking at the total environmental impacts before issuing a permit. The benefits of the Consolidated Permit Program were never realized. Today, within Region VIII, the only remnant of the program is the application form for hazardous waste handlers designed for the merged program. The other aspects of the program, such as a central permit office or review and issuance of multi-media permits, were not implemented.

Mr. Sellers' studies reveal several reasons for the downfall of the program, including a change to an administration unfamiliar with the goals of the program, the slow development of the pertinent permit programs, the limited number of permits

evaluated during the early 80's, and lawsuits that contested specific aspects of the separate programs.[11] What followed within EPA was an effort to "deconsolidate" the regulations, which ultimately led to the demise of the consolidated permit program.

Despite the failed efforts of EPA at merging permits, several States have developed successful programs. Barry Rabe studied the State of Washington's Environmental Coordinations Procedures Act.[12] The Act was designed to coordinate the State's permit process, including a master application form, consolidated hearings, consolidated administration and judicial reviews, and coordination by a single agency official.

II. NEW INTEGRATION INITIATIVES

Numerous new initiatives have been employed within EPA to improve integration of the environmental programs. Several of these efforts are presented in this Section.

A. Technology Transfer

EPA's Task Force on Technology Transfer and Training was created to explore "how EPA could most effectively leverage its people, knowledge, and resources in support of Regional, State, and local efforts to improve overall environmental performance in the field."[13] The Task Force highlighted the need to place more emphasis on technology transfer and training as an integral part of the regulatory process. It recommended creation of an Office

of Technology Transfer and central contacts in each Region and State. Additionally, the Task Force called for promotion of cooperative technology transfer activities with industry and universities. If this technology transfer effort works it should result in cross-media coordination, thus further integrating the environmental programs.

B. The EPA Institute

The EPA Institute was established in October 1985 by the Administrator. The purpose of the Institute is to provide Agency personnel a single source of information about training and personal career development opportunities, as well as serving as a focal point for training for the States.[14] The Regional Offices have recently appointed staff to this responsibility. The Institute should aid in integration of the various programs within EPA. It can also further facilitate this integration by developing and offering courses along the lines of an interrelated environmental management approach.

C. Office of Pollution Prevention

The purpose of this new office is to collect and manage data on waste reduction efforts, to coordinate source reduction efforts in the different media programs and to establish a reporting mechanism in conjunction with the Emergency Planning and Community Right-to-Know Act (SARA Title III). A recent article in Hazmat World covers industries fears of increased

regulation, however there is much support for a program that will collect, organize, and share waste reduction information.[15] This effort is another example of actions to integrate environmental management; in this case preventative measures that cross several programs.

D. RCRA/CERCLA Integration

In 1987, the Agency espoused a new effort titled, "RCRA/CERCLA Integration" to unify the two programs to achieve their mutual goal - protection of health and the environment. This initiative was intended to allow for flexibility and effective use of resources and to avoid duplication of effort for those RCRA facilities that become CERCLA sites. Several aspects of this initiative have already begun. The Environmental Priorities Initiative activities are underway. They include using CERCLA resources to investigate priority RCRA sites and ultimately make decisions as to which cleanup authority will be most effective.

Another aspect of the RCRA/CERCLA integration effort is to bring RCRA corrective action and Superfund cleanups together, making them more consistent. These integration activities are still underway. The Syntex site is a perfect example of where a merged RCRA and CERCLA program can be effective. Instead of addressing the two ground-water plumes under separate environmental laws and using personnel in two different programs, EPA could save time and resources by approaching the ground-water

contamination as a whole, under one integrated program. Moreover, a merged program would ensure consistent site investigation techniques and cleanup standards.

This author believes that EPA should go further than the RCRA/CERCLA Integration" initiative and evaluate organizational changes to place the cleanup programs (Superfund, RCRA corrective action, and the Leaking Underground Storage Tank Program) into the same functioning unit. This concept was recommended by Joel S. Hirschhorn, a senior associate at the Congressional Office of Technology Assessment. Mr. Hirschhorn wrote in his article in Hazmat World, that "cleanup of contaminated sites is now being implemented through an increasingly fragmented system that includes Superfund, corrective action under the hazardous waste regulatory program, asbestos cleanup,....A single national cleanup program would offer enormous potential for greater administrative efficiency, and better information and technology transfer."[17]

III. RECOMMENDATIONS AND CONCLUSIONS

Through an overview of three of the major Federal environmental laws and an assessment of a real life case study this report examined the problems and limitations of our present day environmental regulatory system. This author has shown that the laws are segmented, they apply to the separate media, while contamination does not adhere to these boundaries. Examples of gaps and inconsistencies between the laws have been presented and

legislative and EPA organizational problems have been reviewed.

Despite these issues and problems, the case study illustrates coordination of the cleanup efforts within the Agency is working - no easy task. The jury is still out on the effectiveness of the resource utilization on the Syntex site. Duplication of staff and money will be difficult in this media-structured organization where legal authorities arise from separate statutes and programs are funded from different appropriations.

The last part of this report examined some of the integration efforts that have been tried, some that succeeded and some that failed, as well as a look at new integration initiatives within EPA. From this the author believes she sets the stage for further examination of actions to fully integrate implementation of the environmental laws. This author concludes this report by making several specific recommendations for consideration and further study.

RECOMMENDATIONS FOR FURTHER CONSIDERATION:

1. Initiation of formation of a Joint Committee on the Environment in the Congress to oversee and coordinate the legislative work of the numerous Committees and Subcommittees that relate to environmental issues.
2. Evaluate merging the cleanup programs (CERCLA, RCRA corrective action, and LUST) into one coordinated organization

within EPA.

3. Initiate legislative changes to fashion the RCRA corrective action and LUST programs after the Superfund ARARs program.

4. Reintroduce the Integrated Environmental Assistance Act of 1979.

5. Integrate the efforts of the new EPA offices that deal with cross-media issues, such as the EPA Institute, the Office of Technology Transfer, the Office of Pollution Prevention, and any cross-media data management programs.

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